

USEFUL HOME CARPENTRY



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HIBERNIA WORKS, SHEFFIELD, ENGLAND

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USEFUL HOME CARPENTRY

FOREWORD

TOOLS are necessary in every home. A packing case may have to be opened; a shelf fixed in the pantry; stair eyes or coat hooks may require screwing up; the back yard latch may need repairing; or a lock may have to be put on the coal house, the poultry run, or the garden shed. These and a hundred similar little jobs have always to be tackled even in the smallest cottage.

But mere repairing is incidental work. Tools soon become companions for which we have a real affection, and with them we wish to *make* things. Scores of household articles we can make at home: light items of indoor and outdoor furniture, occasional fittings, and sundries of all kinds. Where we have to be careful is in the selection of suitable tools for the particular class of work we have in view.

The first tools to be bought should be those which are absolutely necessary—tools for ordinary household work. It is of little use having the tool box filled with items which are seldom needed, and the wise plan is to buy handy tools in the first instance, and add to these as occasion demands. Select tools which are stamped with the makers' name and warranted, because cheap common steel will neither sharpen nor carry a good edge.

From time to time good tools should be added to the kit as required. Here only a general suggestion can be offered. The character of the outfit depends largely on the particular work to be handled; but, for guidance, the following list of tools may be given as one which is the result of consultation with experienced craftsmen.

Saw, 24 ins. long, eight points to the inch, sharpened for general work—that is, to cross-cut or rip.

Tenon Saw, 12 ins., twelve teeth to the inch. Can be used for wood or meat.

Nail Hammer with claw at back.

Nail Punch, medium.

Carpenter's Chisels, with handles socketed into blades; one $\frac{1}{2}$ in. and one $\frac{3}{4}$ in.

Chisels, ordinary bevelled-edge pattern; one $\frac{1}{4}$ in. and one $\frac{3}{8}$ in.

Gouge, $\frac{1}{2}$ in., sharpened from outside.

Cold Chisel, about 4 ins. long by $\frac{3}{8}$ in. diameter, drawn at point to about $\frac{1}{2}$ in.

Screwdrivers : one 8 in. with flat blade and one 6 in.

Jack Plane, sunk handle pattern, with 2 in. blade.

Smoothing Plane with 2 in. iron ; or metal block plane with $1\frac{1}{4}$ in. iron.

Ratchet Brace with 5 in. crank.

Twist Bits, $\frac{3}{8}$ in. and $\frac{5}{8}$ in. (Russell Jennings pattern) ; shell bit or pin bit, $\frac{1}{4}$ in. ; Morse pattern $\frac{1}{4}$ in. twist bit with square head to fit hand brace (this can be used for wood, metal, marble, etc.).

Countersink, rose pattern, for wood, brass, etc.

Files : one 4 in. triangular saw file ; 8 in. or 10 in. flat file, bastard cut ; 3 in. or 4 in. knife file for small work.

Bradawl, medium blade (or two of different size).

Gimlet (large) for enlarging holes after using $\frac{1}{4}$ in. bit, etc.

Pliers and wire cutters (combined), 6 in. or 8 in. over all ; 4 in. round nosed pliers for wireless and general work.

Pincers, medium size.

Try Square, 8 in. blade, preferably with mitre combination at top of stock.

Boxwood or steel Rule, 2 ft. or 3 ft.

India medium Oilstone in case and Oil Can of sewing machine type.

Beechwood Marking Gauge.

To the above list some may wish to add certain plumbers' and gas fitters' tools. Other tools that might be considered later are :—

Screwdriver bit to fit the brace ; two expansion bits to bore from $\frac{3}{4}$ in. to 3 in.

Automatic spiral Screwdriver.

Spokeshave, medium size.

Tinman's Shears or Snips.

Hack Saw, with blade for metal.

Metal Smoothing Plane and Rebate Plane, 1 in.

Coping pattern Fret Saw. This carries a stronger saw than the usual hand fretwork frame.

Fretwork Hand Frame, say, 14 in., with Nos. 2 and 3 saw-blades.

Gouge, $\frac{1}{2}$ in., ground from inside.

Rat-tail file, 6 ins. Cabinet file, 8 ins., bastard cut for wood.

Dovetail Saw, 8 ins.

Chisels, additional, not to exceed $1\frac{1}{4}$ ins.

USEFUL HOME CARPENTRY

HINTS ON TOOL OPERATIONS

SAWING

THE principal woods used by craftsmen of to-day are mahogany, oak, American black walnut, satin walnut, American whitewood, yellow pine, white deal and red deal. These timbers can be obtained machine planed and machine sawn in a

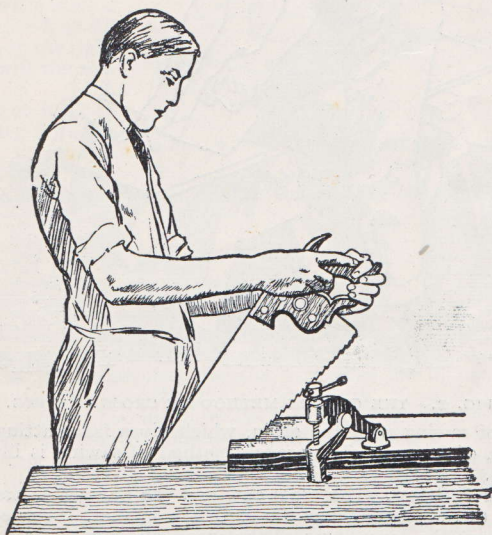


FIG. 1.—POSITION FOR OVERHAND RIP SAWING.

variety of sizes, thus doing away with much laborious work. The development of the plywood industry has been another boon to the woodworker, and alder, birch, oak, walnut and mahogany three-ply wood can now be procured in small or large sheets in varying thicknesses. Whether the timber is bought partially machine wrought, or in the rough, the first operation on the part

of the craftsman will be to cut it up to his own requirements. For this purpose he will require a rip (or handsaw), a cross cut saw (or a panel saw), and a tenon (or a dovetail) saw.

Ripping. The rip saw has large teeth which are sharpened by filing them at right angles to the edge of the blade. They have a planing action on the timber, and this type of saw is used for cutting in the direction of the grain. Fig. 1 shows the overhand

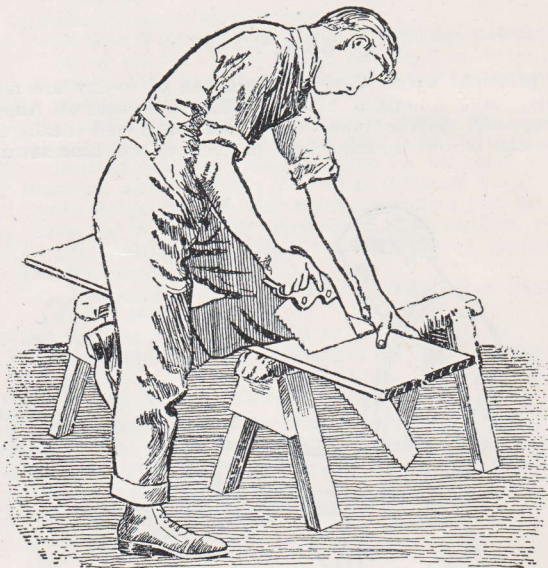


FIG. 2.—THE CROUCH METHOD OF CROSS CUTTING.

method of sawing with the grain, which gives fast cutting with a minimum of fatigue. The crouch method of sawing is illustrated at Fig. 2.

Cross Cutting. The cross cut, and the panel saw are similar in shape to the rip saw, but the teeth are smaller. The needle like points sever the long fibres of the wood like two knife cuts, and the sawdust crumbles away, leaving a saw kerf, until the wood is separated. Fig. 2 illustrates the position of the sawyer near the finish of the cut, where he grasps and supports the overhanging piece of wood so as to prevent a shattered edge.

Tenon Saws. The tenon and dovetail saw are stiffened and tensioned by a brass or steel back, which, of course, limits the depth of the cut, and at the same time gives the necessary weight to the blade as it approaches its cut. Tenon and dovetail saws are used for the work suggested by their names, but the tenon saw

is used indiscriminately for general light work, such as the cutting of laths, battens, etc. The tenon saw is held by "the three, one, thumb method," the index finger pointing in the direction of the saw cut. Do not attempt to force the saw; let it run lightly and freely to and fro, and use the first finger of the left hand to guide it on the line and to assist in keeping the blade at right angles to the wood.

Fig. 3 shows how to commence sawing the shoulder of a half lap joint. Place the saw on the line and draw it backwards about three times so as to start the saw cut; then, as the sawing is continued, gradually drop the right hand until the saw blade is level. The bench hook or cutting board, which is shown under the left hand, is quite a useful appliance for holding the wood firm and steady.

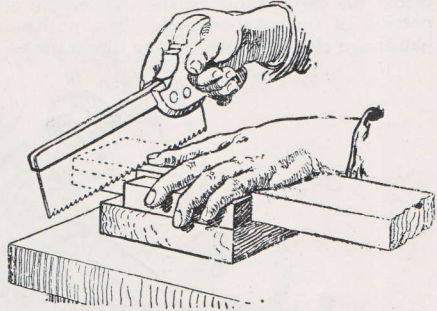


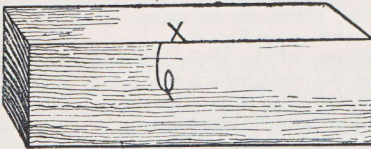
FIG. 3.—CUTTING A SHOULDER WITH THE TENON SAW.

PLANING

PLANING is usually the second operation to be performed

The workshop method is to plane up one side and one edge of all the timber required for the particular job in hand, and to place on these surfaces the face and edge mark. Never use blue pencil for this purpose because it works into the pores of the wood and is difficult to remove. These marks are shown below, the face mark being somewhat like a comma. The work is tested lengthways with a straightedge to see that it is straight, and then tested with a try square to see if the edge is at right angles.

The wood is now ready for gauging to its desired width, and this is accomplished by adjusting the marking gauge and striking the line on to the wood.



FACE AND EDGE MARKS.

The work is planed down to the gauge line by roughing down the timber

with a jack plane as at Fig. 4, after which it is finished by taking off the final shavings with a trying plane. Thicknessing the wood is now taken in hand, and the gauging and rough planing is accomplished as above, and the trying plane is used to finish the surface as at Fig. 5. When using a plane the worker stands in a similar position to a boxer. He presses down the front of the plane with his left hand so as to keep it in contact with the wood, whilst his right hand grasps the handle and supplies the greater portion of the motive force. The positions of the body and the hands are clearly shown in the illustrations, and the worker should

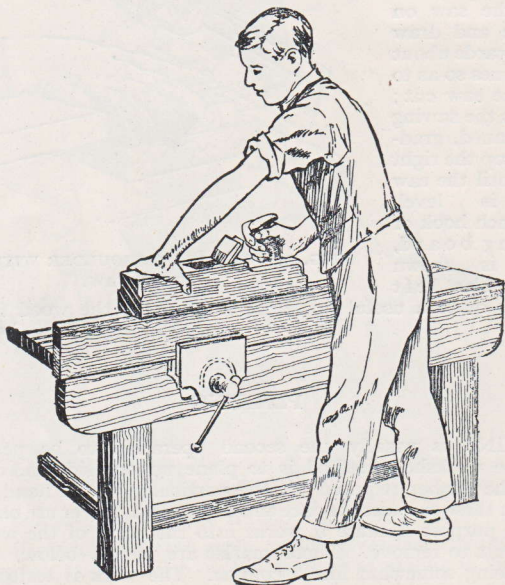


FIG. 4.—HOLDING AND USING THE JACK PLANE.

remember to keep the left elbow fairly well up and to take good sharp strokes. The smoothing plane, as its name suggests, is for finishing and is held and used as at Fig. 6.

When planing boards endways of the grain there is always a risk of splintering the edge of the work where the cut is finished, and there are two methods of avoiding this. The first is to plane from each edge of the wood and finish the cut taken with the plane at (or about) the centre of the planed edge. The second method is to cut off the corner beforehand.

There are, of course, many other types of planes, such as bull-nose, chariot (or block) planes, rebate planes, hollow and round planes, tongue and grooving planes, plough planes, old woman's tooth (or router) planes, compass planes, etc., and some

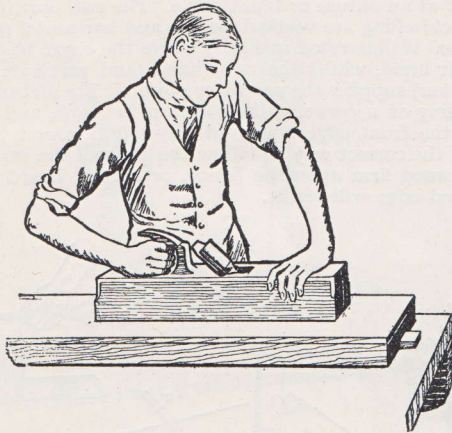


FIG. 5.—HOW TO USE THE TRYING PLANE.

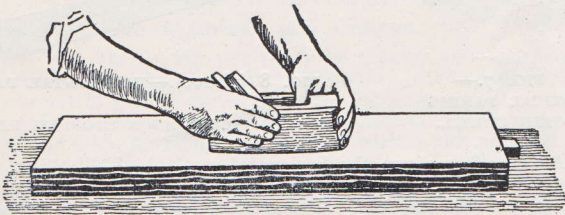


FIG. 6.—HOLDING THE SMOOTHING PLANE.

of these the worker may add to his kit as occasion demands. Wipe a rag which has been dipped in raw linseed oil over the sole of your plane occasionally; it keeps the tool in good condition and makes for easy planing, especially when planing up resinous woods like pitch pine or red deal.

CHISELLING

IN the hands of a skilful worker it is remarkable what can be done with a properly sharpened chisel. If the blade of the chisel be reasonably thin and the grinding fairly acute, the paring will be more easily removed than if the blade is ground and sharpened at an obtuse or blunt angle. The two principal methods used for chiselling are vertical paring and horizontal paring. The first method is illustrated at Fig. 7 where the chisel blade is guided by the left hand, whilst the right hand (and very often the chest of the worker) supplies the necessary power. The picture represents the chiselling of a curve at the corner of a board, and the worker starts at the front edge and gradually works round to the end; this being the correct way to follow the grain of the wood. Always have the wood firm upon the bench, or cutting board; otherwise a splintered edge will result.

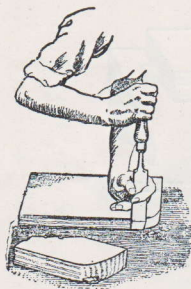


FIG. 7.—
VERTICAL PARING
WITH CHISEL.

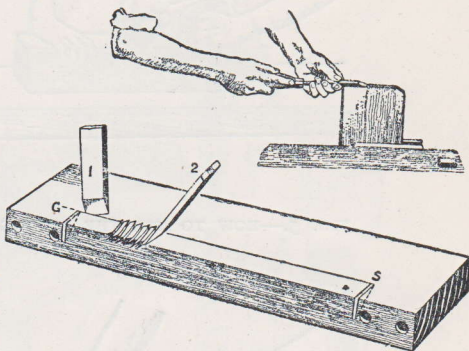


FIG. 8 (above).—HORIZONTAL PARING.

FIG. 9.—CUTTING A STOPPED REBATE.

At Fig. 8 is given the horizontal method of chiselling. Here the tool is forced forwards, and at the same time is given a side motion or shearing cut. Particularly note that, to prevent a shattered edge at the finish of the cut, it is necessary to first remove a small corner of the wood as suggested. The flat side of the chisel engages the wood in nearly all cases, excepting where the curvature of the wood will only allow of the "ground side" being used nearest to the timber.

At Fig. 10 the necessary chiselling operations are given for the cutting of a recess for a butt hinge. The proposed recess has a series of saw kerfs cut into it so as to facilitate the easy removal of the waste wood; after which the chisel is grasped as a knife (A) and the gauge line is deepened. The chisel is then stabbed down-

wards to deepen the ends as at B ; after which the paring proper is commenced as at C.

Chiselling out a stopped rebate is a somewhat similar operation and is shown at Fig. 9, where GG represents the gauge lines and S the saw cut. The finished sides of the rebate would, of course, be smoothed off with a small bull-nose plane.

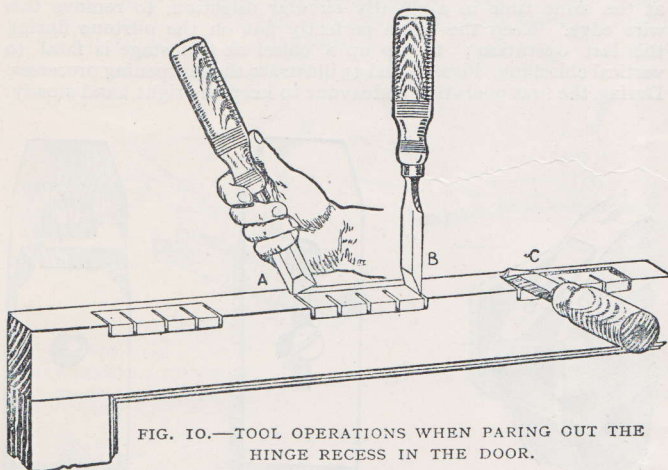


FIG. 10.—TOOL OPERATIONS WHEN PARING OUT THE HINGE RECESS IN THE DOOR.

GRINDING AND SHARPENING

Planes, Chisels and Gouges.

IF planes and chisels are not properly ground and sharpened the work will be laborious and the quality will be indifferent. Half the secret of joinery work is in knowing how to sharpen and set your tools. If your plane blade has accidentally been snipped on its cutting edge by coming in contact with a nail or sprig, it may be released from the stock by giving it two or three smart taps with a hammer. The cap or back iron is then unscrewed, and the cutting iron or blade may be held end on to the grindstone so as to actually dull its cutting edge until the dents are ground away. The blade is then held on to the grindstone as at Fig. 11 until it is ground up to a cutting edge, and a copious supply of water should be used to keep the iron cool and to wash away the particles of steel and ground stone.

The cutting irons of jack planes should have a fair amount of convexity or rounding as at Fig. 12, but on no account should they be "dubbed" off at the corners as at B ; this rounding should be gradual. Trying and smoothing planes should not have as much rounding ; in fact they should be all but straight. Rough

work requires more rounding on the iron than is required for finishing work.

After grinding, it is necessary to sharpen the blade so as to obtain a fine edge, and the plane iron or chisel should be rubbed backwards and forwards on the oilstone until a wire edge appears. The blade is then turned over and it is rubbed backwards, and at the same time in a slightly circular direction, to remove this wire edge. Keep the blade perfectly flat on the oilstone during this last operation; to tip up a chisel at this stage is fatal to vertical chiselling. Figs. 14 and 15 illustrate the sharpening processes. During the first operation endeavour to keep the right hand steady.

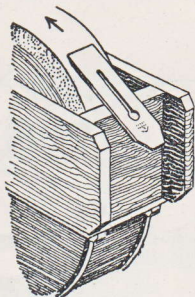


FIG. 11.—
HOW THE PLANE
IRON IS HELD FOR
GRINDING.

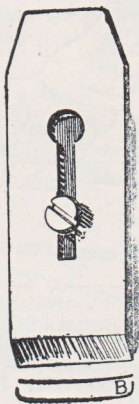


FIG. 12.—
FRONT VIEW
(JACK PLANE).

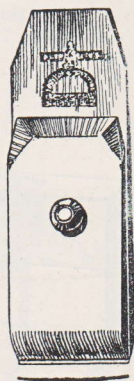


FIG. 13.—
BACK VIEW
(JACK PLANE).

Setting the cap or back iron must not be confused with the setting of the cutting blade in the body of the plane. The cap of a jack plane should be set about $\frac{1}{16}$ in. from its cutting edge; or, for very rough work, it may be set to almost $\frac{1}{8}$ in. from the cutting edge. All cap irons must be perfectly on their respective cutting blades, otherwise they will choke up. The cap irons of trying, smoothing and metal planes must, of course, be set much nearer to the cutting edge. The set of the plane means the projection of the edge of the blade beyond the face or sole of the plane. This projection in conjunction with the setting of the back iron determines the thickness of the shaving that will be removed.

To "set" the blade in the plane the worker sights along the sole to see the projection. If the blade projects too far, he can decrease the cut by tapping the plane with a hammer; when this is done it is always good policy to again tap the wedge, to

make sure that all is secure. To decrease the cut of a smoothing plane tap it smartly on its heel with a hammer; and to remove the blade and wedge from the body of the smoothing plane bang the heel smartly on to the bench top. To increase the cut of any plane of the wedge type, a slight tap with a hammer at the top of the blade will have the desired result. Metal planes have, of course, special screws and levers to adjust their blades. Cap irons do not require to be sharpened.

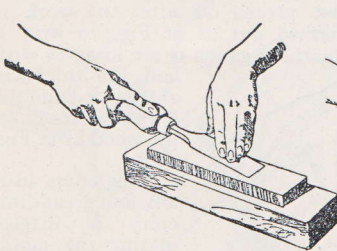


FIG. 14.—
SHARPENING CHISEL.
FIRST OPERATION.

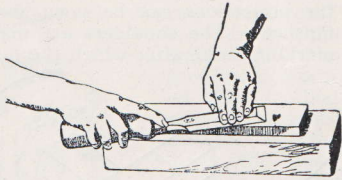


FIG. 15.—
SHARPENING CHISEL.
REMOVING WIRE EDGE.

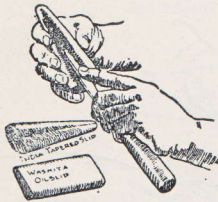


FIG. 16.—SHARPENING
OUTSIDE OF GOUGES.

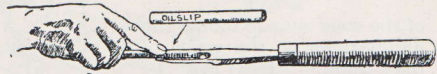


FIG. 17.—
SHARPENING INSIDE OF GOUGES.

Paring Gouges are sharpened by rubbing the ground side with an oilslip and removing the wire edge from the inside of the blade with the rounded edge of the slip (see Figs. 16 and 17). Scribing gouges are ground from the inside of the blade when purchased, and they may be sharpened by rubbing the inside or concave portion with the edge of a suitable oilslip. Do not rub scribing gouges with a slip on their outsides; simply push the edge into a piece of wood and this will remove the roafe or wire edge. Remember that if you can "see" the edge of a chisel or plane blade, then the *edge* is not there, and the blade requires harpning.

THE HALF LAP OR HALVING JOINT

THE half lap joint illustrated at Fig. 18 can be used to join the ends of battens or framework such as we might use for many every day joinery purposes. The joint is usually smeared with paint and nailed or screwed together for outdoor work; but for interior work it is generally glued and screwed. C represents the cheek, and S is the shoulder. In most cases it is unnecessary to trim up the ends of the wood before the joint is made, because the projections can be sawn and planed off after the work is finished. The shoulders are marked out as at Fig. 19 with a marking knife, after which the marking gauge is set to agree with

half the thickness of the wood and the lines are struck on the wood as at Fig. 20.

Beginners usually find great difficulty in manipulating the marking gauge and there is always a tendency for the point

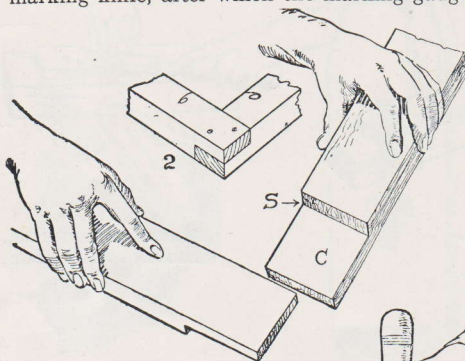


FIG. 18.—HALF LAP OR HALVED JOINT.

of the steer spur to follow the undulations of the grain of the wood. This can be avoided by tipping the gauge until the point of the spur only just touches the board and the edge of the wooden stem runs on the surface of the timber as at Fig. 20 (right-hand sketch). The gauging of the lines must be done from the face side of the work; on no account gauge one piece from the front and the other from the back.

After setting out the work, place one piece of the wood on to the cutting board and pare away by the horizontal chiselling method a small channel at the shoulder line. The idea of making this channel is to give the tenon saw a start and prevent it from running off the shoulder line. For rough work, however, the saw

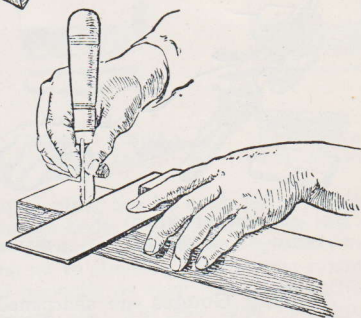


FIG. 19.—MARKING THE JOINT.

cut may be made direct on to the marked line. The sawing of the shoulder is illustrated on page 5.

If the work is small a tenon saw may be used to saw the cheeks ; but, if the work be large, a hand saw or a panel saw may be required. Commence the sawing as suggested in Fig. 21 until the saw-cut reaches the corner at A ; then either turn the wood in the vice or alter your position and saw to B.

Finally, place the the wood in a vertical position and, holding the saw horizontal, cut down the work until the shoulder is reached. This method assists a beginner to saw straight down the lines. Experienced workers can, of course, keep to the line with one sawing operation, but beginners generally have to

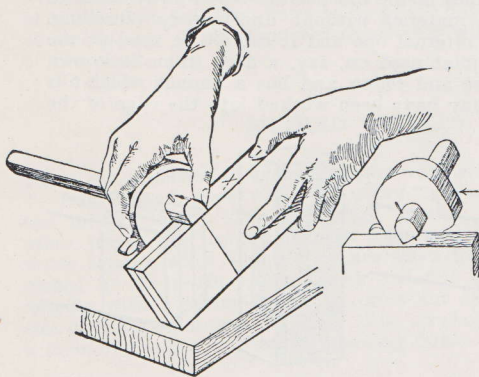


FIG. 20.—USING THE MARKING GAUGE.

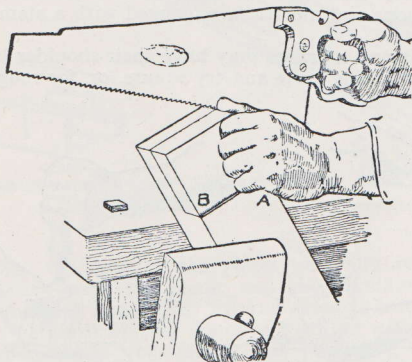


FIG. 21.—SAWING THE CHEEK.

do a little chiselling to ease off the inaccuracies of their sawing. Be careful to saw on the *waste* side of your marked lines, otherwise the tenons or other joints will be too slack.

MORTISE AND TENON WORK

EVERY handyman should be able to construct a simple door frame by the mortise and tenon method, or to knock together a framework that may have wire netting stretched upon it. This joint in its simplest form is sketched at Fig. 22, the parts being shown separated. Fig. 23 illustrates how it is marked out and gauged, and the holes in the mortise are bored away so as to get rid of the waste material without unnecessary chiselling. The joint shown is an internal one and it cannot be used at the end of a frame. The joint used on, say, a door frame is known as the *haunched* mortise and tenon, and has a haunch which fills up the groove which may have been worked into the edge of the

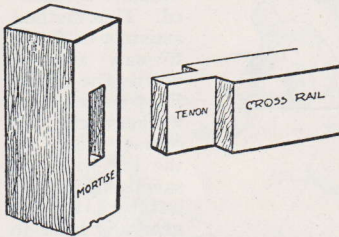


FIG. 22.—SIMPLE MORTISE JOINT.

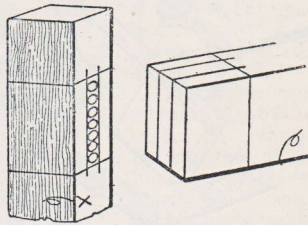


FIG. 23.—JOINT GAUGED.

rails to take a panel. For this type of work, the stiles or uprights are held together for marking in the vice or with a G clamp, after which the tenons and mortises are gauged with a stem-set mortise gauge.

The tenons and mortises may have their shoulder lines marked out with the marking knife and try square, or, for rough work, the

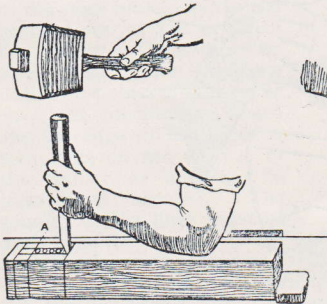


FIG. 24.—METHOD OF CHOPPING OUT A MORTISE.

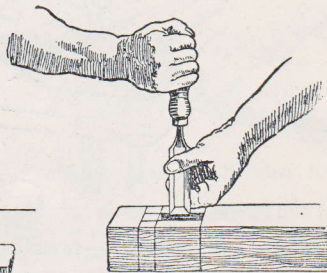


FIG. 25.—PARING OUT SIDES OF MORTISE.

lines may be marked with a pencil. After the waste wood has been bored from the mortise with a twist bit, the stiles are laid on the bench and chopped out with a mortise chisel. Commence to chop the mortise near its centre, and gradually work backwards, as at Fig. 24. Start again at the centre and chop out until the line A is reached. This first stage of the chopping and paring should go about half way through the timber; after which the wood should be turned over and the chopping continued. The sides of the mortise will then have to be pared out with a firmer chisel, as at Fig. 25. Here again the chisel cuts will meet in the centre of the wood.

MITRED JOINTS

IT is the ambition of every amateur woodworker to make picture frames, and cope with the many and varied applications of the mitred joint. The mouldings, picture rails, bolection, or other pieces are usually marked out with a Marples' No. 2212 mitre square, after which they are sawn to the marked line, or placed in the mitre sawing block and cut to their approximate lengths with a tenon, panel, or cross cut saw, according to the size of the moulding to be used. Fig. 26 shows the way in which a moulding is cut in the mitre sawing box.

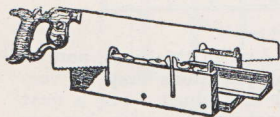


FIG. 26.—MITRE CUTTING BOX.

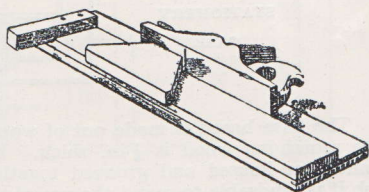


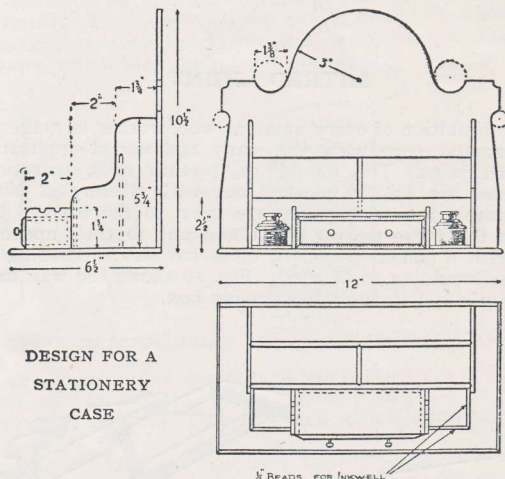
FIG. 27.—MITRE SHOOTING BOARD.

After sawing, the ends of the pieces generally require some little manipulation with the plane, and the mouldings are laid on to a mitre shooting board (Fig. 27) and eased to a smooth joint. The ends may be glued up and cramped together with a Marples' No. 6810 corner cramp; or, failing this appliance, the worker will have to use the well-known string method. A hardwood block, about $1\frac{1}{4}$ ins. thick and about 2 ins. diameter, is turned with a groove in its edge and cut into four pieces. A piece of picture or blind cord is put around the blocks which engage the corners of the frame, and the cord is tightened up with a twist stick.

DESIGN SECTION

STATIONERY CASE

This neat little stationery case should be made up either in satin walnut or thin oak. The pen and ink and stamp drawer make it particularly useful in any household.



DESIGN FOR A
STATIONERY
CASE

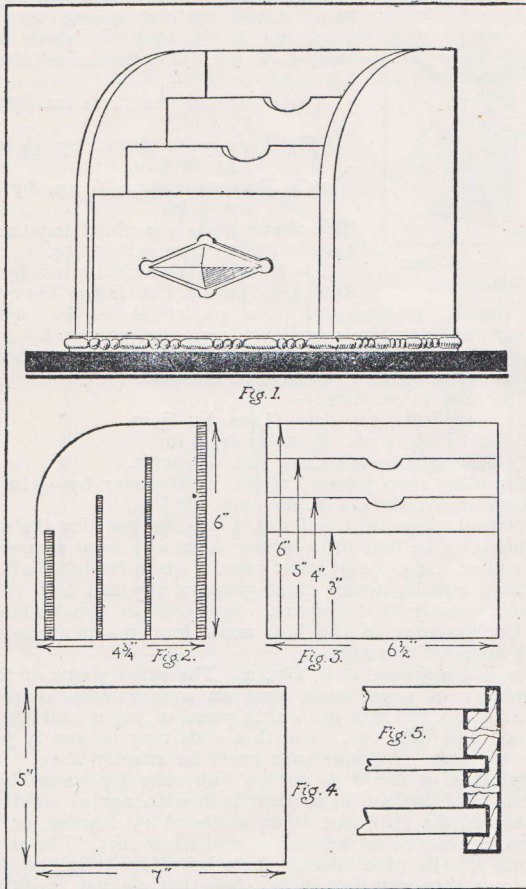
The base board is made out of wood $\frac{1}{2}$ in. in thickness, and all the remaining wood is $\frac{1}{4}$ in. thick. The partitions may be vee-jointed or housed and grooved together and glued. For a neat job it is advisable to avoid the use of panel pins or sprigs, because they look unsightly. The base board is screwed on with small screws, after which it is lined on the bottom with baize or thin felt.

STATIONERY RACK

Woodworkers generally welcome ideas for small useful articles which enable them to use up scrap material. The neat little stationery rack shown at Fig. 1 could be made from almost any wood. Oak will accord with the style best, and if mahogany or walnut is used it will be advisable to omit the turned beading around the base, and to substitute an inlay or inlay transfer in place of the bevelled Jacobean block.

To make the rack, cut two sides as at Fig. 2; a back, two divisions, and a front as at Fig. 3; and a bottom as at Fig. 4. The

sides and bottom may be $\frac{3}{8}$ in., the front and back $\frac{1}{4}$ in., and the divisions $\frac{1}{8}$ in. thick. To fit the parts together, rebate the back into the sides, groove in the front and divisions as shown at Fig.



DESIGN FOR A STATIONERY RACK.

5, and pin on the bottom. The bevelled block is of $\frac{1}{4}$ in. stuff, 3 ins. long by 1 in. wide, and is backed with a piece of $\frac{1}{16}$ in. stuff which is cut to overhang slightly, as shown at Fig. 1.

MODEL WORKING WINDMILL

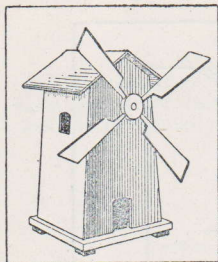


FIG. 1.—MODEL WINDMILL

This windmill model is a working one, being fitted with a spindle and back pulley so that it may be driven from a clockwork toy. The house requires the following parts:—

- (A) Front and back, 11 ins. by 6 ins. by $\frac{1}{4}$ in.
- (B) Two ends, $9\frac{1}{2}$ ins. by $4\frac{1}{2}$ ins. by $\frac{1}{4}$ in. or $\frac{3}{8}$ in.
- (C) Two roof parts, 6 ins. by 4 ins. by $\frac{3}{16}$ in.

The above parts are glued together and fastened with fine panel pins.

The base (D) is a board 7 ins. by 6 ins. and $\frac{1}{2}$ in. thick. A fairly heavy base is, of course, necessary if the model is to be used as a working toy. It stands on four toes, 1 in. square by $\frac{1}{4}$ in. or $\frac{3}{8}$ in. thick, these being glued and screwed in position so that they stand in about $\frac{1}{4}$ in. from the edge of the base.

For the sails we require:—

- (F) Four Sails, 5 ins. by $1\frac{1}{4}$ ins. by $\frac{3}{16}$ in.
- (G) Sail Hub, 2 ins. diameter by $\frac{3}{8}$ in.
- (H) Sail Spindle, 9 ins. by $\frac{3}{8}$ in. diameter.
- (J) Pulley (two pieces), $1\frac{1}{2}$ ins. in diameter by $\frac{3}{16}$ in.
- (K) Two Washers, 1 in. diameter by $\frac{1}{4}$ in.

First procure a piece of dowel rod, $\frac{3}{8}$ in. diameter, for the spindle (H). This may be had for a penny from any local carpenter or cabinet maker. A piece of stout cane, if quite straight, will serve the purpose equally well. Next prepare the sail hub (G) and bore a hole exactly in the centre. Into this the spindle is lightly glued. On the edge of the hub mark four points (equidistant) and bore holes for the sails.

The sails are shown at F, Fig. 2. The exact shape of these is not a matter of importance, and an approximate shape may easily be drawn full size on a thin piece of paper and traced to $\frac{3}{16}$ in. wood and then cut. The thin ends may be gently pointed to enter the hub. All four sails must be exactly alike.

The glueing of the sails to the hub calls for some thought. The flat face of the sail is neither flush with nor at right angles to the face of the hub, but at an angle of 45 degrees (or half a right angle). The little sketch (X) will show this. Fix each sail by pouring a little glue into the hole bored for it in the edge of the hub and then pressing it in. See that all four sails are at the same angle and correctly in line in every way.

To prevent the spindle from slipping and thus causing the sails to collide with the roof, small washers are glued to it inside the house. This will be seen from the diagram (Y), and in order to fit the washers the roof should be left off until the spindle is

adjusted. Assuming that we have the sails and hub fitted to the spindle, pass the latter through the hole *c* in front. Slip on the two washers, and pass the spindle through the corresponding hole in the back.

Adjust matters so that the sails will easily clear the roof, then place the washers so that the spindle (whilst perfectly free in its movement) will keep correctly in position. The washers may be held in place with a touch of glue, and the roof can be then nailed on.

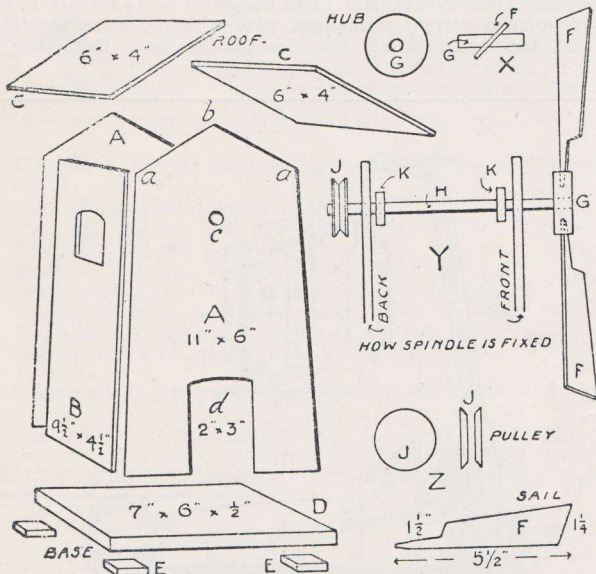


FIG. 2.—CONSTRUCTIVE PARTS OF MODEL WINDMILL.

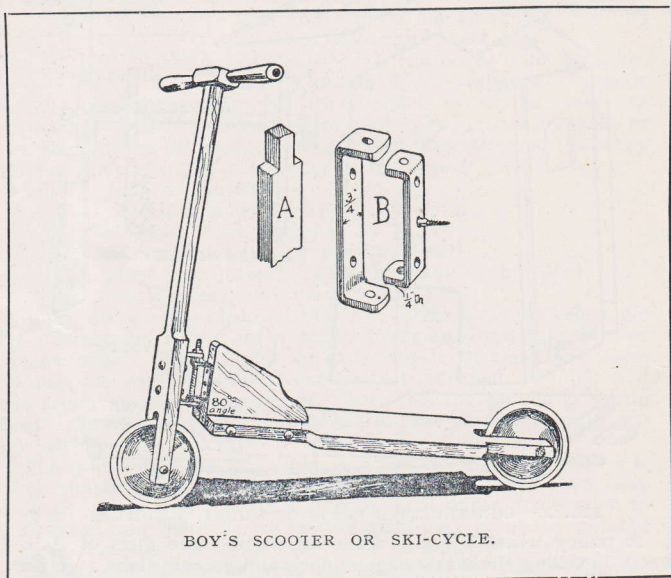
A pulley wheel is easily made by cutting two discs of $\frac{3}{16}$ in. wood, bevelling the inside edge of each and gluing them together (see sketch Z). The meeting bevelled edges provide the groove. If, however, a small metal pulley of from 1 in. to $1\frac{1}{2}$ ins. diameter is available, it will save a good deal of trouble. The pulley is fixed at the back end of the spindle, the spindle being cut off in length as required.

See that all working parts are smooth. Glasspaper the spindle well, and take care that it is perfectly free in its movements—not too loose, but by no means tight. If the model is turned to face the wind the sails will immediately revolve, and the back pulley may be used for some simple mechanical toy.

SCOOTER OR SKI-CYCLE

The illustration shows a scooter suitable for boys up to eleven years of age. The six inch diameter wheels may be made of hardwood, but it is better to purchase the pressed steel wheels with wired-on solid rubber tyres.

The base board is of oak, 23 ins. long by $4\frac{1}{2}$ ins. wide by 1 in. thick. Each end of this board is reduced in width to $3\frac{1}{2}$ ins., as indicated. The upright piece is 29 ins. long by $2\frac{7}{8}$ ins. wide by $1\frac{1}{8}$ ins. thick, and this is reduced in thickness to $1\frac{1}{4}$ ins. by $1\frac{1}{8}$ ins. The top of the upright is tenoned with a shoulder (as shown at A), and the tenon fitted into the handle piece, this being 11



BOY'S SCOOTER OR SKI-CYCLE.

ins. long by $1\frac{1}{8}$ ins. by $1\frac{1}{4}$ ins. thick. The handle piece is rounded down at each end to form the handles.

The bracket which carries the ironwork is 7 ins. long by 6 ins. wide, in 1 in. oak. This bracket is let into the base piece and bolted into position with two bolts of $\frac{3}{8}$ in. diameter. The iron hinge arrangement is sketched at B, and is $4\frac{1}{4}$ ins. long over all. A $\frac{3}{8}$ in. bolt acts as the pivot pin. Ordinary standard bolts are used for the axles of the wheels.

CHINA RACK FOR LIVING ROOM

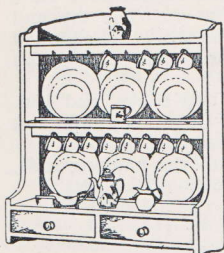


FIG. 1.—CHINA RACK

This china rack is just the piece for the living-room of a small family. The dimensions shown in Figs. 2 and 3 could be varied to suit special requirements. For a rack of the size shown, the stuff used should be $\frac{3}{4}$ in. thick, the principal parts being given below.

The rack will hold all the china required for everyday use. The two drawers will be found a great convenience, as one or both may be fitted with divisions and lined with baize for the storage of plate and cutlery.

The detail sizes are :—

Two sides (A), $35\frac{1}{2}$ ins. long by 10 ins. wide, shaped as shown at Fig. 4.

Shelf (B), $29\frac{1}{2}$ ins. long by $5\frac{1}{4}$ ins. wide ;

Shelf (C), $29\frac{1}{2}$ ins. long by $5\frac{3}{4}$ ins. wide ;

Shelf (D), $29\frac{1}{2}$ ins. long by $9\frac{3}{4}$ ins. wide ;

Shelf (E), $29\frac{1}{2}$ ins. long by $9\frac{1}{4}$ ins. wide ;

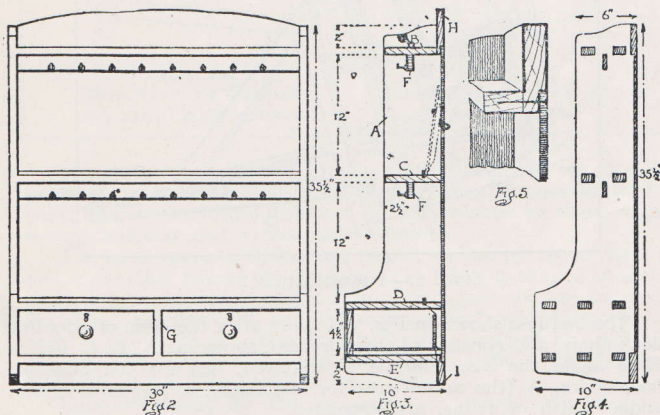
Two hanging rails (F), $29\frac{1}{2}$ ins. long by 2 ins. wide ;

Drawer Division (G), $5\frac{1}{2}$ ins. long by $9\frac{3}{4}$ ins. wide ;

Top rail (H), $29\frac{1}{2}$ ins. long by $4\frac{1}{2}$ ins. wide ;

Bottom rail (I), $29\frac{1}{2}$ ins. long by $2\frac{3}{4}$ ins. wide.

The construction is carried out by tenoning the shelves and hanging



FIGS. 2-5.—DETAILS OF CONSTRUCTION.

rails into the sides (Fig. 4), and tenoning the drawer division into the two lower shelves. The shelves (C) and (D) should have plate slips ploughed into their upper sides (see Fig. 3). The top and bottom rails are rebated into and screwed to the back edges of the sides, and the ply back is rebated into these rails (Fig. 5) and the back edges of the sides.

The drawers have $\frac{3}{4}$ in. fronts, $\frac{3}{8}$ in. sides and backs, and $\frac{1}{4}$ in. bottoms. The sides, fronts and backs are dovetailed up, and the bottoms grooved into them in the usual manner.

Several brass hooks should be screwed into the hanging rails, and four stout wall plates will be required to hang the rack.

FOLDING BED REST

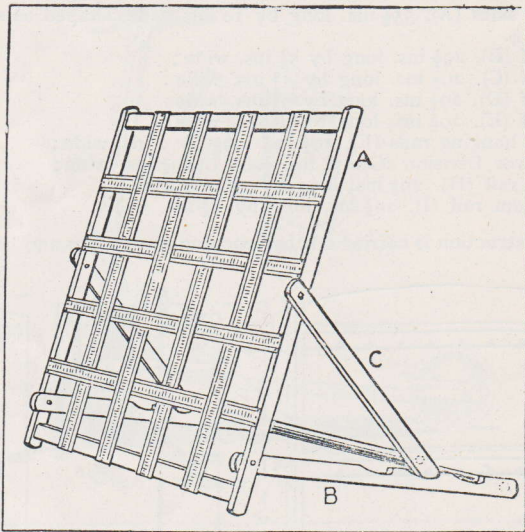


FIG. 1.—FOLDING BED REST.

The bed rest shown in Fig. 1 is made after the style of a folding deck chair, and consists of three frames shown at A, B, C, Fig. 2. Here again the size may be as required, but for the principal framework, A (the actual rest for the back), a length of 27 ins. and a width of 21 ins. are suggested.

The uprights or stiles of this frame (A) will be 27 ins. long by $1\frac{1}{2}$ ins. by $\frac{3}{4}$ in. The cross rails, top and bottom, may be $1\frac{1}{4}$ ins.

by $\frac{7}{8}$ in. The rails are tenoned (and preferably wedged) to the stiles, and all sharp edges should be removed. The webbing will be interlaced and stretched as tightly as possible, it being well to tack down with three brass-headed nails at each end.

The second frame, or rack (B) has two notched rails $1\frac{1}{2}$ ins. by $\frac{7}{8}$ in. joined by a stretcher rail 1 in. by $\frac{7}{8}$ in., tenoned in and wedged. The notched rails (B) are bolted to the main frame (A) about 3 ins. from the foot. The length of B will be about 23 ins.; that is, when folded, the B frame must clear the upper cross rail of the main frame. The distance from the foot of the stile (A) to the centre of the pivoting bolt should not exceed 3 ins., as the rest stands more firmly on the bed if the notched rails (B) are kept low. Iron bolts, $1\frac{1}{4}$ ins. by $\frac{1}{2}$ in. may be used, a washer being placed between the wood parts, as at Z, Fig. 2.

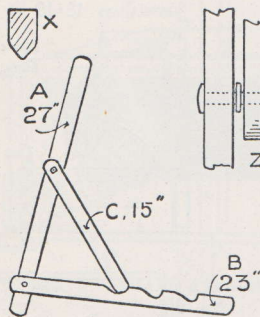


FIG. 2.
SIDE VIEW OF UPRIGHT,
LEG AND CROSS SUPPORT.

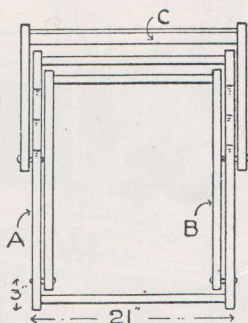


FIG. 3.
PLAN, SHOWING THE BED
REST FOLDED.

The notches on B may number three or four, the first one being so placed that the main frame (A) is almost vertical, it being remembered that, when a patient wishes to write in bed, a perpendicular rest yields more comfort.

The back support (C) has two pieces, 15 ins. by $1\frac{1}{2}$ ins. by $\frac{7}{8}$ in., and a stretcher rail $1\frac{1}{2}$ ins. by $\frac{7}{8}$ in. The latter is shaped in section as X, Fig. 2, so that it may adequately engage the notches cut in B. The stretcher rail will be tenoned and wedged as before, and, as shown in the plan at Fig. 3, the stretched rail will clear the main frame when the bed rest is folded flat. The C part is bolted in the same way as the rack piece.

Suitable woods for the bed rest are beech, ash, American whitewood and oak. Sound pine will serve for a light article, but, of course, will be less durable.

SIMPLE TOILET GLASS

In making the frame of this toilet glass, the upright pieces (a), should be grooved either with a plough plane or with one of the planes used for making tongues and grooves on $\frac{7}{8}$ in. boards. The grooves are deepened with a chisel to accommodate the tenons which are cut on the cross rails. The two cross rails will be grooved on their inside edges with the same setting, and with the same plane that was used to groove the upright rails, after which the rear side will be cut away to form the rebate.

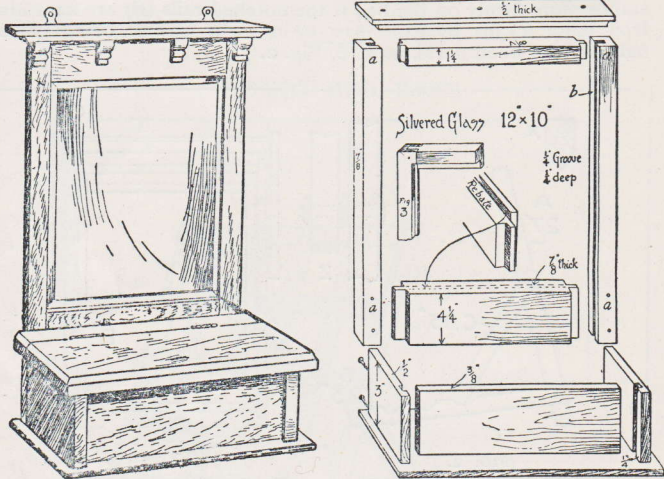


FIG. 1.—TOILET GLASS. FIGS. 2 and 3.—DETAILS OF CONSTRUCTION.

The tenons will next be cut as indicated, their length being about $\frac{3}{4}$ in. Then the frame will be glued together, and when dry the portion (b) will be pared away with a $\frac{3}{4}$ in. chisel to give the required rebate for the glass.

Fig. 3 (inset) shows a back view of one corner of the frame when completed, and it will be noticed that the joint is simply an open slot mortise, with the rebated portion cut away. To make the joints secure a small nail may be put into the work from the back of the frame. The capping mould is glued and nailed with three fine brads into its position.

This moulding will effectively strengthen the top of the framing because it is glued across the joints and therefore secures them. The small dentils under the capping mould (see Fig. 1) are made out of any short bit of moulding. The back should be of 3 mm. plywood.

SMALL RECEIVING SET CABINET

FOR TWO OR THREE VALVES.

In Fig. 1 is a perspective sketch of a cabinet to take a panel 20 ins. by 8 ins., and as in Figs. 3 and 4 we have certain dimensions given it can be calculated how much material is needed for the job. The top (A), sides (B), and back (C) are of $\frac{1}{2}$ in. material when finished. The bottom (D) is $\frac{5}{8}$ in., and a base-board which slides in under the two rebate pieces, but is not illustrated, is of $\frac{1}{2}$ in. This base-board can be of whitewood or deal, if it is dry and not liable to warp, and to this the panel is screwed and the set built up upon it to be drawn out with the panel when required. The following quantities of material will be needed. Suitable woods are mahogany, oak or walnut, or alternatively, satin walnut or American whitewood, both of which stain and polish to a good mahogany or walnut finish.

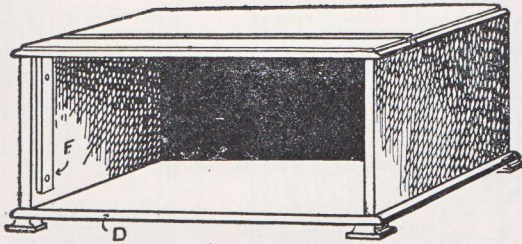


FIG. 1.—SMALL RECEIVING SET CABINET.

	Long. ft. ins.	Wide. ins.	Thick. ins.
A 1 Top.....	1 10	11	$\frac{1}{2}$
B 2 Sides	0 9 $\frac{1}{2}$	8	$\frac{1}{2}$
C 1 Back	1 9	8	$\frac{1}{2}$
D 1 Bottom	1 10 $\frac{1}{4}$	11 $\frac{1}{4}$	$\frac{5}{8}$
E 4 Feet	0 3	2	$\frac{1}{2}$
F 2 Fillets.....	0 7 $\frac{1}{2}$	1	$\frac{1}{2}$

One pair of 2 in. brass butt hinges.

All these measurements must be regarded as the finished sizes, and it is important that the opening in front should not be less

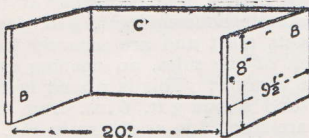


FIG. 2.—THE BOX FRAME.

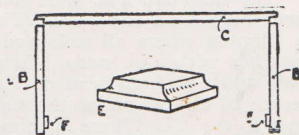


FIG. 3.—PLAN AND TOP.

than 20 ins. by 8 ins., so that the panel will fit in easily. It will be seen that the top in Fig. 1 is divided about 3 ins. back from the front to allow of fixing the front portion permanently, while the back portion is hinged to the top edge of C. Part of the top may be clamped, that is, have pieces tongued on either end transversely but this may be omitted if the wood is mild and quite dry.

ALLOTMENT HUT

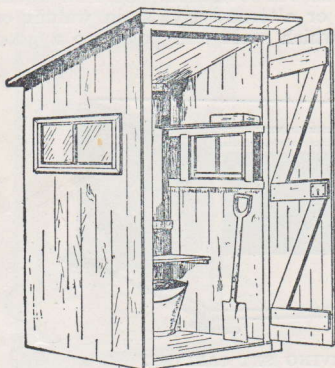


FIG. 1.—ALLOTMENT HUT.

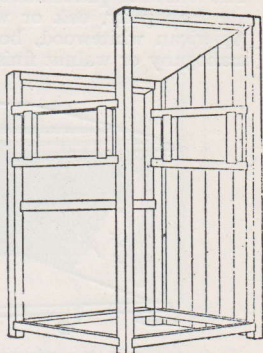


FIG. 2.—FRAMEWORK.

An allotment does not seem complete without a small shed of some kind for storing tools, seeds and other garden utensils. The dimensions given need not be strictly adhered to for this kind of construction, which allows a little latitude of sizes in any direction, but the given dimensions will be amply large enough to meet ordinary requirements. The hut is made of a 2 in. by 2 in. deal framing, covered with $\frac{3}{4}$ in. tongued and grooved match boards, and is 7 ft. high at the front by 3 ft. wide. The back is 6 ft. high and the same width.

The sides are 4 ft. wide and, of course, will be higher at the front edge than the back. The simple housing joint, $\frac{1}{2}$ in. deep, is adopted where all rails and posts meet and are securely held together with 4 in. nails. In each of the sides, an opening 2 ft. wide and 1 ft. high is made for a window. This is placed in the centre of the width of the hut, and about 3 ft. 6 ins. from the floor to the sill. These openings are framed in as shown in Fig. 2.

The floor is then nailed on to the bottom rails provided, and

the roof is allowed to overhang all round about 4 ins., and is then covered with felt. The door is hung with 15 in. T hinges and is fitted with a dead lock.

To construct a hut to the given dimensions the following materials will be required:—

69 running feet of 2 in. by 2 in. deal.

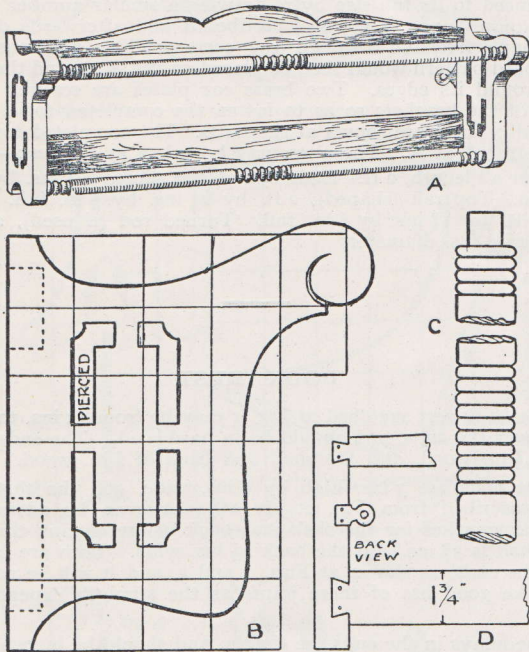
360 running feet of 4 in. by $\frac{3}{4}$ in. deal match-boards.

12 running feet of $1\frac{3}{4}$ in. by $1\frac{3}{4}$ in. sash tile material.

18 sq. ft. roofing felt; 4 sq. ft. 21 oz. glass; 1 pair 15 in. T hinges;

1 dead lock (left hand); $\frac{1}{2}$ gallon creosote.

BATHROOM OR LAVATORY TOWEL RAIL



TOWEL RAIL.

- (A) SKETCH; (B) BRACKET (in 1-in. squares); (C) RAIL;
(D) LAP-DOVETAILED JOINT.

Here we show a neat towel rail which can be made up in polished American black walnut. It comprises examples of the wood-

turner's, the cabinet maker's and fretcutter's art, thus giving a variety of work to the maker. The model could, of course, be made up in any kind of wood suitable for a polished surface, or, if desired, it could be made in a soft wood and finished in white enamel.

The shaped ends are cut out of $\frac{7}{8}$ in. wood, and may be pierced by boring suitable holes and sawing out the waste wood with a bowsaw or fretsaw. D illustrates the method of lap-dovetailing and screwing the cross rails into the end brackets. The turned rods are made out of 1 in. wood, and are worked up to the pattern shown at C; or, if the work is going to be enamelled, two good sweeping brush handles will answer the purpose. The end brackets (B) are shown plotted into 1 in. squares and this shape can easily be reproduced to its full size by re-drawing a similar number of one-inch squares upon a piece of cardboard and afterwards drawing the shape freehand through the corresponding positions. The cardboard pattern would then be placed on the wood and the pencil run around its edges. Two brass ear plates are screwed to the edges of the brackets so as to fasten the completed towel rail to the wall; these are shown at sketch D. The completed towel rail is illustrated at A. The sizes may be taken as follows:—

Over all length, 2 ft. Ends out of one piece, $12\frac{1}{2}$ ins. by 6 ins. by $\frac{7}{8}$ in. Top rail (shaped), 2 ft. by $2\frac{1}{4}$ ins. by $\frac{1}{2}$ in. full. Lower rail, 2 ft. by $1\frac{3}{4}$ ins. by $\frac{1}{2}$ in. full. Turned rod (if used), 2 ft. by 1 in. or $1\frac{1}{4}$ ins. diameter.

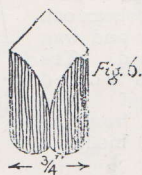
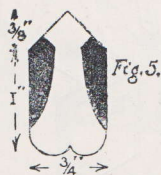
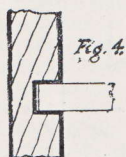
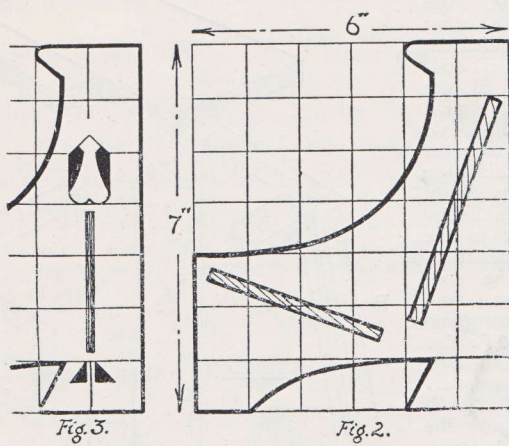
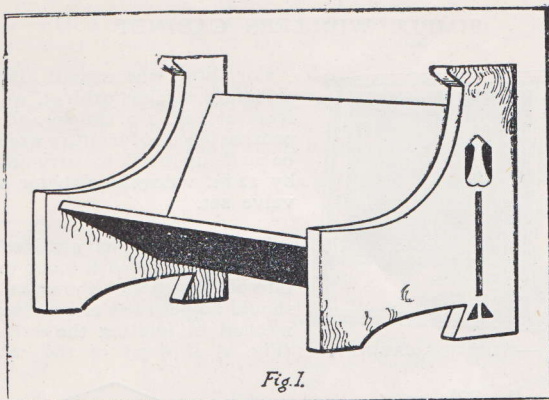
BOOK REST

The book rest sketched at Fig. 1 may be from 15 ins. to 20 ins. long over the ends, and should be in hardwood. The ends should be of $\frac{1}{2}$ in. wood, and the shelf and back of $\frac{3}{8}$ in. wood.

The ends are 7 ins. high by 6 ins. wide, and the shape may be transcribed from Fig. 2. It will, however, be advisable to cut the trenches for the shelf and back before cutting the shape. The shelf is $3\frac{1}{2}$ ins. and the back $4\frac{1}{2}$ ins. wide. Both are trenced into the ends, as shown at Figs. 2 and 4, and it will be necessary to make good fits of these joints as the strength depends upon them.

The inlays in the ends are simple, and should be in two colours which will contrast both with each other and with the background. The wood inlay should be from $\frac{1}{16}$ in. to $\frac{1}{8}$ in. thick; either of the patterns shown at Figs. 5 or 6 may be used, and the position for inlaying may be gathered from Fig. 3.

Those who have not sufficient mastery over their tools to tackle the simple inlaying, may, of course, omit it.



BOOK REST, WITH DETAILS OF CONSTRUCTION.

SIMPLE WIRELESS CABINET

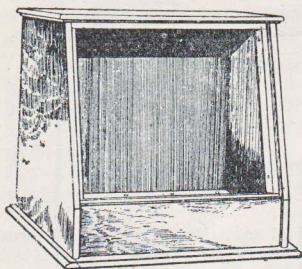


FIG. 1.—WIRELESS CABINET.

width is not available. Note also the other joints indicated. The two ends (A, Fig. 2), are tongued and grooved and glued together to obtain the necessary width; after which they are cut to the shape shown at C. The construction and joints are given at B and C. The top and the bottom boards are screwed in position and the cabinet is stained Jacobean oak colour and wax polished. The sizes added overleaf are taken from the actual model.

For those who cannot afford an elaborate wireless cabinet, we illustrate at Fig. 1 a simple and inexpensive piece of furniture which can be made up in oak to carry an 18 in. by 12 in. vulcanite slab for a four valve set.

To readers who have gained some little experience with tools, the details of construction shown in Fig. 2 should be perfectly clear. Note the method of jointing the ends at A (Fig. 2) if wood of the required

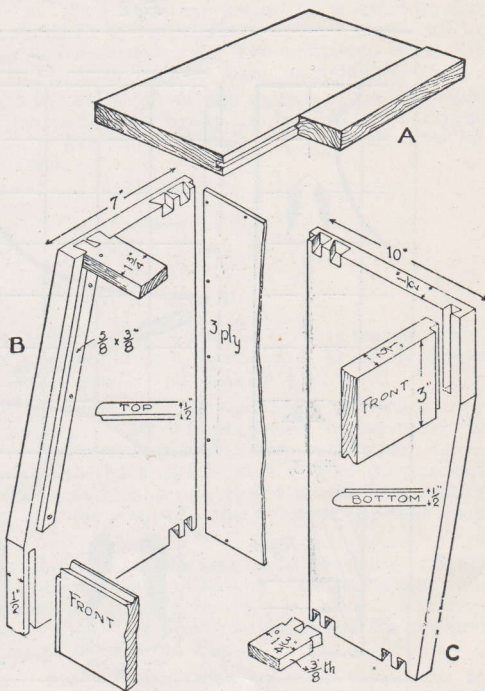


FIG. 2.—DETAILS OF CONSTRUCTION

The parts required are:—

- 2 Ends—1 ft. 3 ins. by 10½ ins. by 7/16 in. oak.
- 1 Top—1 ft. 9 ins. by 7¾ ins. by 7/16 in. oak.
- 1 Bottom—1 ft. 9 ins. by 11 ins. by 7/16 in. oak.
- 1 Front—1 ft. 7 ins. by 3½ ins. by 7/16 in. oak.
- 2 Strips—1 ft. 3 ins. by 5/8 in. by 3/8 in. oak.
- 2 Joints to Ends—1 ft. by 2¼ ins. by 7/16 in.
- 3 Bearers—1 ft. 7 ins. by 1½ in. by 3/8 in. pine.

Due allowances for working have been made in the above sizes.

WORKSHOP AND GARDEN TRESTLES

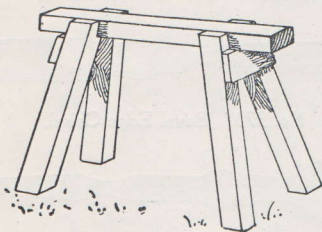


FIG. 1.—SAWING TRESTLE.

SOME form of trestle is necessary in the workshop for sawing planks and other timber, as well as for supporting articles under construction. They can be made up in a variety of ways, but the simplest is that shown in Fig. 1. For this a top is required which may be made of 4 in. by 2 in. deal, 2 ft. 6 ins. long. The legs are of 3 in. by 3 in. deal, jointed to the top so that they will be splayed out to 1 ft. 6 ins. at the bottom, whilst

they are let into the wood about 1 in. at the top. The width across the top of the trestle, including the legs, is 8 ins. Two small pieces are nailed on (one at each end), made of 1 in. deal, shaped as shown, to brace up the legs, which can be nailed or screwed to the top boards.

Another useful adjunct for sawing heavy timber such as trees, poles and fire wood is shown at Fig. 2. It is made entirely out of 3 in. by 3 in. deal. The ends have half-cut-through joints. The legs are 3 ft. 6 ins. long, and the joint is so arranged that the portion of leg below it is just twice the length of the piece above the joint. That is, the centre of the joint is one-third of the way down the legs. The distance apart of the feet at the bottom may be about 2 ft. A length of 20 in. by 1 in. batten may be nailed each side of the cross joint as shown, and the same size of material may be used for bottom rails, to be screwed or nailed about 4 ins. above the ground to the top edge of the rail. These sawing horses are very convenient.

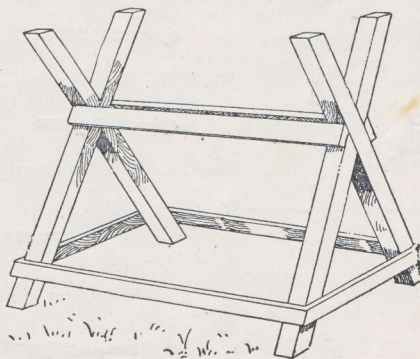
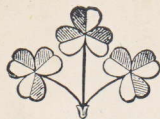


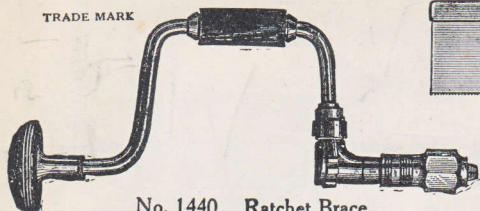
FIG. 2.—SAWING HORSE.



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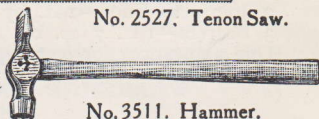
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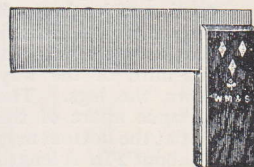
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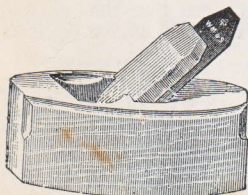
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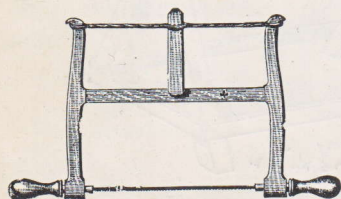
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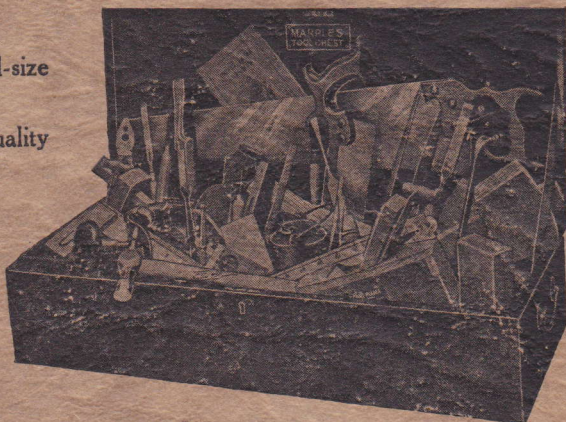
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